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Contributions to the Andean Senecioneae (Compositae). Taxonomic novelties for Peru (VII)

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Abstract. In the framework of the Andean Senecioneae, the species *Monticalia nitida*, *Senecio apolobambensis*, and *S. josei* are added as new records to the Peruvian flora. The following names are synonymized: *Senecio tergopurpureus* with *Dendrophorbium biserrifolium*, both *Senecio yunguyensis* and *S. allapajanus* with *S. herrerae*, and *S. diplostephioides* with *S. pflanzii*. In all cases, a taxonomic discussion is provided, as well as pictures of living plants when available.

Keywords: Andes, Asteraceae, Senecioneae, taxonomy.

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Introduction

The tribe Senecioneae (Compositae) is very well represented in the High Andes. After South Africa and Mexico, the area comprising central and northern Andes (Peru to Colombia) is the third center of generic diversity worldwide (Nordenstam *et al*., 2009). Some genera such as *Dendrophorbium* (Cuatrec.) C.Jeffrey (ca. 75 spp.), *Gynoxys* Cass. (> 100 spp.), *Monticalia* C.Jeffrey (ca. 60 spp.), *Pentacalia* Cass. (ca. 160 spp.), and *Senecio* L. (> 200 spp.) appear to be highly diversified (Nordenstam *et al*., 2009; Calvo & Buira, 2018).

The first steps for understanding the Senecioneae diversity in the Andes were achieved during the first decades of the nineteenth century, mainly due to the contributions of Kunth (1818), Candolle (1838), and Weddell (1856). Among the several botanists that subsequently contributed to improve the knowledge of this plant group, the Catalan Josep Cuatrecasas (1903–1996) deserves special attention. Aside from describing an extraordinary number of new species, his works dealing with the generic taxonomy of the tribe have become a reference (e.g. 1950, 1951, 1981, 1999 [as Díaz-Piedrahita & Cuatrecasas]). Indeed, the current circumscription of most north Andean Senecioneae genera responds to Cuatrecasas' criterion and the advances that resulted from the DNA-based phylogenetic analyses only entailed a few adjustments. On the other side, no one as Cuatrecasas contributed most to resolving taxonomically complicated genera such as *Pentacalia* and *Senecio* in the framework of the central and northern Andes.

Herein, we record for the first time in Peru the species *Monticalia nitida* (Kunth) C.Jeffrey, *Senecio apolobambensis* Cabrera, and *S. josei* Sklenář. Likewise, the name *Senecio tergopurpureus* Cuatrec. is synonymized with *Dendrophorbium biserrifolium* (Kuntze) D.J.N.Hind, both *Senecio yunguyensis* Cuatrec. and *S. allapajanus* Cuatrec. with *S. herrerae* Cabrera, and *S. diplostephioides* Cuatrec. with *S. pflanzii* (Perkins) Cuatrec.

Material and Methods

This contribution is the result of bibliographic review, field work in Bolivia and Peru, and the revision of specimens mainly kept at USM. Additionally, digital specimens from F, GH, K, LP, LPB, MO, MOL, NY, P, SI, and US were studied; herbarium acronyms follow Thiers (2021). A Nikon SMZ-1 Stereo Microscope was used for the examination of the microcharacters.

Results and Discussion

New records

1. ***Monticalia nitida*** (Kunth) C.Jeffrey, Kew Bull. 47(1): 72. 1992. *Cacalia nitida* Kunth, Nov. Gen. Sp. 4: 127. 1818 [ed. folio]. *Senecio nitidus* (Kunth) DC., Prodr. 6: 421. 1838. *Pentacalia nitida* (Kunth) Cuatrec., Phytologia 49(3): 257. 1981. Type: Ecuador? ["Crescit in Regno Quitensi?" according to the ind. loc.], *F.W.H.A. Humboldt & A.J.A. Bonpland s.n.* (holotype: P barcode 00320222 digital image!).

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Distribution

Colombia (Cauca, Cundinamarca, Meta), Ecuador (Azuay, Morona-Santiago), Peru (Cajamarca, Piura).

Taxonomic remarks

Monticalia nitida is recorded for the first time in the Peruvian territory. Until now, it was known from Colombia and Ecuador (Ávila *et al.*, 2016; sub *Pentacalia nitida*). This species is an erect, branched shrub characterized by displaying discoid capitula with broadly lanceolate to ovate, arachnoid supplementary bracts. The leaves are ovate, shortly petiolate, rounded to subcordate at the base, entire to distantly denticulate (rarely somewhat dentate) and revolute at the margin, with the adaxial surface glabrous and usually shiny and the abaxial surface lanate. *Monticalia nitida* is morphologically close to *M. andicola* (Turcz.) C.Jeffrey, a species widely distributed from Costa Rica to central Peru (Pasco Department). Some useful characters to differentiate from one another are the leaf lamina shape (ovate, rounded to subcordate at the base in *M. nitida* vs. lanceolate to elliptic-lanceolate, attenuate to obtuse, rarely rounded at the base in *M. andicola*) and the supplementary bracts (broadly lanceolate to ovate in *M. nitida* vs. narrowly lanceolate to linear-subulate in *M. andicola*). However, it should be noted that some plants with intermediate characters have been found in Colombia (Díaz-Piedrahita & Cuatrecasas, 1999).

With regard to the provenance of the type material, Cuatrecasas (1950, 1960) stated that it most probably comes from nearby Bogotá (Colombia) instead of from Ecuador.

Additional specimens examined

Peru: Cajamarca: Jaén, Sallique, El Páramo, 3300 m asl, 28 Jun. 1998, *J. Campos & al. 5117* (USM-261409); Sallique, El Páramo, 3400 m asl, 22 Jul. 1998, *J. Campos & al. 5320* (USM-261420); paramillo de Pomahuaca, antes del pajonal, 3200 m asl, 8 Nov. 1999, *C. Díaz & J. Campos 10922* (USM-179903). Piura: Huancabamba, Carmen de la Frontera, Rosarios Bajo, 4°54’26’’S 79°22’44’’W, 3100–3200 m asl, 12 Jul. 2004, *A. Cano, N. Valencia & I. Salinas 14710* (USM-209732); Carmen de la Frontera, Rosarios Bajo, campamento minero río Blanco, entre montañas Henry’s Hill y Nueva York, 4°54’29’’S 79°23’22’’W, 3100–3395 m asl, 20 Apr. 2006, *A. Cano, N. Valencia & I. Salinas 16217* (USM-211892); Carmen de la Frontera, alturas de Nueva York, 3280–3555 m asl, 27 Jul. 2006, *A. Cano, W. Mendoza & N. Valencia 16782* (USM-212586); Talaneo, 3500 m asl, 29 Nov. 1961, *C. Friedberg 820* (USM-32479).

2. ***Senecio apolobambensis*** Cabrera, Hickenia 2(4): 14. 1984. Type: Bolivia. La Paz, Franz Tamayo, Ulla Ulla, estribaciones de la cordillera de Apolobamba, 4700 m asl, 3 Apr. 1982, *X. Menhofer 1082* (holotype: SI barcode 001001 digital image!; isotype: LPB barcode 0000586 digital image!).

Distribution

Bolivia (La Paz), Peru (Puno).

Taxonomic remarks

Senecio apolobambensis was considered an endemic species to Bolivia (Beck & Ibáñez, 2014a). Herein, the species is recorded for the first time in southern Peru on the basis of the collection *Beltrán & Salinas 6450.* This species is a subshrub characterized by having oblanceolate-spatulate, long pseudopetiolate, glabrous leaves and discoid capitula with ca. 13 involucral bracts. It is highly variable with regard to the leaf margin, which can be entire to distantly and shallowly dentate (2 to 4 teeth per side, sometimes the lower ones blunt at the apex). It might be confused with *S. pinnatilobatus* Sch. Bip., a species also known from the Andean highlands of northern Bolivia and southern Peru. However, this latter species differs in having deeply pinnatilobate leaves.

Additional specimens examined

Peru: Puno: Santiago de Putina, Ananea, Tapiycucho, cercano al Proyecto Regina de la empresa minera Sillustani S.A., 14º41’45’’S 69º40’50’’W, 4789 m asl, 1 Feb. 2008, *H. Beltrán & I. Salinas 6450* (USM-225344).

3. ***Senecio josei*** Sklenář, Nordic J. Bot. 30(4): 394. 2012. Type: Ecuador. Loja, cordillera las Lagunillas (de Sabanilla), páramo de las Lagunas Negras, 4°42’38’’S 79°26’12’’W, 3330 m asl, *P. Sklenář, J. Macková & P. Macek 12027* (holotype: PRC barcode 455289 digital image!; isotypes: QCA n.v., QCNE n.v.).

Distribution

Ecuador (Azuay, Loja), Peru (Piura).

Taxonomic remarks

Senecio josei is recorded for the first time in northern Peru. Thus far, it was considered an endemic species from southern Ecuador, although Sklenář (2012) already commented that the occurrence of this species in northern Peru was possible given the close proximity of one locality to the Peruvian border. It belongs to the informal *Senecio* group *Lasiocephalus* (Calvo & Freire, 2016) and is easily distinguishable by its linear, up to 5 cm long leaves, which are white-lanate on the abaxial surface, the lax racemiform or paniculiform synflorescences, and the penicillate style branches. *Senecio imbaburensis* Sklenář & Marhold is a morphologically close species, but differs in leaf length (up to 2.5 cm long) and in having mostly solitary capitula. Their distribution areas do not overlap.

Concerning the etymology, Sklenář (2012) stated: “The epithet refers to José Cuatrecasas, whose work on the high-Andean ‘senecios’ inspired my interest in this plant group”.

Additional specimens examined

Ecuador: Azuay: P.N. Cajas, Cuenca-Molleturo road near pass, 3600–4200 m asl, 26 Jul. 1982, *S.E. Clemants & al. 2148* (QCA barcode 146579); P.N. Cajas cerca de la laguna Patoquinoas, 2°46'52''S 79°12'25'', 3834 m asl, 9 Nov. 2012, *D. Minga & A. Verdugo 2437* (HA-8321); P.N. Cajas, Cuenca-Molleturo km 28, sendero Patoquinoas-Totoras, 3730–3800 m asl, 29 Aug. 2003, *C. Ulloa & D. Minga 1399* (HA-5098). Peru: Piura: Huancabamba, Talaneo, Huaca, [1961], *C. Friedberg 205* (USM-29386).

New synonyms

1. ***Dendrophorbium biserrifolium*** (Kuntze) D.J.N.Hind, Kew Bull. 63(3): 515 (2008). *Senecio biserrifolius* Kuntze, Revis. Gen. Pl. 3[3]: 171 (1898). Type: Bolivia. ["Ostseite der Cordillere nach Rio Juntas zu" according to the ind. loc.], 2600 m, 13/21 Apr. 1892, *O. Kuntze s.n.* (holotype: NY barcode 00077399 digital image!).

= *Senecio tergopurpureus* Cuatrec., Collect. Bot. (Barcelona) 3: 263. 1953. Type: Peru. Cusco, below Machu Picchu, 2200 m asl, 24 Jun. 1936, *J. West 6457* (holotype: GH barcode 00012231 digital image!; isotype: MO barcode 714687 n.v.), **syn. nov.**

Distribution

Peru (Cusco), Bolivia (Cochabamba?, La Paz). Beck & Ibáñez (2014b) also recorded this species from Cochabamba Department, although they did not indicate any collection supporting the presence of the species in this region. All the Bolivian specimens we examined come from La Paz.

Taxonomic remarks

Senecio tergopurpureus was hitherto considered as an accepted species only recorded from the Cusco Department in Peru (Dillon & Hensold 1993, Vision & Dillon 1996). It is characterized by the combination of the following characters: stem indumentum hirsute-tomentose; upper cauline leaves sessile, auriculate at the base, acuminate at the apex, dentate, covered with pilose-tomentose indumentum (denser beneath, especially on the midrib), and usually purple colored beneath (Figure 1); capitula disciform; involucral bracts 12 to 13; supplementary bracts strictly linear, a half to a third as long as the involucral bracts; and achenes glabrous. All these characters perfectly match those of *Dendrophorbium biserrifolium*, a species known from northern Bolivia. Since we did not find any character for differentiating both species, the name *Senecio tergopurpureus* is synonymized with *D. biserrifolium*.

Additional specimens examined

Bolivia: La Paz: de Unduavi a Puente Villa, 16º18'49''S 67º54'36''W, 3170 m asl, 12 Aug. 2007, *C. Aedo & al. 14570* (LPB s.n.); Nor Yungas, Unduavi ca. 2 km hacia Chuspipata, 16º18'S 67º52'W, 3200 m asl, 29 Jun. 2002, *S.G. Beck 27838* (US barcode 01846825); Bautista Saavedra, P.N. Madidi, Laji Sorapata, sector Cosñimayu, pasando el río Laji, 14º53'24''S 68º51'40''W, 3272 m asl, 21 Jun. 2010, *A.F. Fuentes & M. Ampuero 16716* (LPB s.n.); Sud Yungas, 3 km E of Unduavi, on new road between La Paz and Chuspipata, 16º17'S 67º53'W, 3300–3400 m asl, *J.C. Solomon 15427* (US barcode 01846823); Nor Yungas, ca. 2 km E of Unduavi on descent to Yolosa, 3500 m asl, 26 Jul. 1996, *J.R.I. Wood 11323* (LPB s.n.).

Figure 1. *Dendrophorbium biserrifolium*. Peru, Cusco, pr. Calca. Picture by E. Huamantupa (not collected).

2. ***Senecio herrerae*** Cabrera, Notas Mus. La Plata, Bot. 9(45): 199. 1944. Type: Peru. Cusco, colinas del Saxaihuamán, 3500 m asl, Apr. 1932, *F.L. Herrera 3567* (lectotype, designated as "holotype" by Freire & Iharlegui (2000: 341): LP barcode 000515 digital image!; isolectotypes: K barcode 000497833 digital image!, LP barcode 000514 digital image!).

= *Senecio yunguyensis* Cuatrec., Collect. Bot. (Barcelona) 3: 279. 1953. Type: Peru. Puno, Yunguyo, 3750 m asl, May 1937, *J. Soukup 589* (holotype: F barcode 0092583F digital image!; isotypes: GH barcode 00012241 digital image!, LP barcode 002542 digital image!), **syn. nov.**

= *Senecio allapajanus* Cuatrec., Brittonia 8: 186. 1956. Type: Peru. Ayacucho, Lucanas, Allpaja [Allpaca], km 6 carretera Puquio-Coracora, 3330–3400 m asl, 23 Apr. 1950, *R. Ferreyra & O. Tovar 7189* (holotype: US barcode 00123384 digital image!; isotypes: LP barcode 002321 digital image!, MOL barcode 00006892 digital image!, USM barcode 000188!), **syn. nov.**

Distribution

Bolivia (Cochabamba, La Paz), Peru (Apurímac, Ayacucho, Cusco, Puno).

Taxonomic remarks

Cuatrecasas (1953), when described *Senecio yunguyensis*, stated that this latter species differs from *S. herrerae* in having deeper dentate leaves, larger capitula and ray florets, and longer and robust peduncles. After a comparative study of the available material, we consider that such differences fall within the variability of *S. herrerae* (Figure 2), and therefore, their synonymy is proposed.

Senecio herrerae is a variable species mainly concerning the indumentum. Typical forms have dense glandular-tomentose indumentum on the synflorescence branches and involucres; however, we studied a few specimens displaying sparse indumentum (e.g. *Metcalf 30298*, *Pennell 13564*). Metcalf's specimen was identified in 1952 in sched. as "Senecio herrerae fma. glabrata" by Cuatrecasas. A few years later, Cuatrecasas (1956) described *S. allapajanus* on the basis of *Ferreyra & Tovar 7189*. This specimen comes from a locality very close to that of Metcalf's collection, but Cuatrecasas did not mention it. After studying several specimens from this region, we conclude that they only differ from *S. herrerae* in having glabrescent leaves. Taking in account the aforementioned indumentum variability, the name *S. allapajanus* is also synonymized with *S. herrerae*. With regard to the locotype indication of *S. allapajanus,* it should be noted that the label information of the specimen at USM is more complete than in the other duplicates, where some information was probably omitted during the transcription process. Since the label of the specimen at USM seems the original one, Cuatrecasas' locotype indication has been complemented.

Senecio herrerae might be confused with *S. pseudotites* Griseb., a species thriving in northwestern Argentina (Catamarca, La Rioja, Salta, Tucumán). However, the latter species has glabrescent or laxly arachnoid synflorescence indumentum (vs. dense to sparse glandular-tomentose synflorescence indumentum in *S. herrerae*) and glabrous or scarcely pilose achenes (vs. densely silky-pubescent achenes in *S. herrerae*). The Peruvian specimens identified as S. cumingii Hook. & Arn. (e.g. Weberbauer 7313) should be referred to S. herrerae.

Additional specimens examined

Bolivia: La Paz: Guaqui, 3900 m asl, 1 Feb. 1921, *E. Asplund 4942* (US barcode 01838680). Peru: Apurímac: Andahuaylas, Moyobamba, 3650 m asl, 4 Jan. 1950, *C. Vargas 8708* (USM-274974). Ayacucho: Puquio, alrededores de la ciudad de Puquio, 14º40'05''S 74º06'56''W, 3310 m asl, 30 Apr. 2006, *H. Beltrán 6083* (USM-224409); Lucanas, near trail Puquio to quebrada de San Antonio, 2800–3000 m asl, 2 Apr. 1942, *R.D. Metcalf 30298* (G s.n., US barcode 01837876); Lucanas, Aucará, 3500 m asl, May 2004, *L. Vargas & G. Mora 265* (USM-188190). Cusco: La Convención, Santa Teresa, 13º24'53''S 72º45'10''W, 3024 m asl, 12 May 2013, *H. Beltrán 7659* (USM-167994); Ollantaytambo, 3000 m asl, 29 Apr. 1915, *O.F. Cook & G.B. Gilbert 446* (US barcode 01837874); colinas del Saxaihuamán, 3600 m asl, Mar. 1930, *F.L. Herrera 220* (LP barcode 010058); Chumbivilcas, Santo Tomás, 3700 m asl, 22 Mar. 1983, *L. van der Hoogte & C. Roersch 2090* (MO barcode 1902532); Espinar, Yauri, 4100 m asl, 13 Apr. 1987, *P. Núñez 7904* (USM-274284); Sacsahuaman, above Cusco, 3500–3600 m asl, 24 Apr. 1925, *F.W. Pennell 13564* (US barcode 01837875). Moquegua: Carumas, 3000–3100 m asl, 21 Feb./6 Mar. 1925, *A. Weberbauer* 7313 (F-552539). Puno: Conima, 3900 m asl, 6 Mar. 1948, *P. Aguilar s.n.* (USM-29351); Lampa, Sillustani ruins, 3650 m asl, 23 Mar. 1977, *J.D. Boeke 1361* (US barcode 01837867); vicinity of Lake Titicaca, along roadsides Chucuito, 3125 m asl, 22 Dec. 1919, *R.S. Shepard 137* (US barcode 01838679).

3. ***Senecio pflanzii*** (Perkins) Cuatrec., Fieldiana, Bot. 27(1): 44. 1950. *Culcitium pflanzii* Perkins, Bot. Jahrb. Syst.49(2): 229. 1913 ["Pflanzii"]. Type: Bolivia. La Paz, Palca, zona basal del Illimani, 4150 m asl, Feb. 1979, *A. Ceballos & al. 560* (neotype, designated by Salomón & Freire (2014: 92): SI s.n. digital image!; isoneotypes: G barcode 00412496!, MA n.v.).

= *Senecio diplostephioides* Cuatrec., Brittonia 12: 189. 1960. *Pentacalia diplostephioides* (Cuatrec.) Cuatrec., Phytologia 49(3): 254. 1981. Type: Peru. Cusco, [cordillera] Ausangate, 4600 m asl, 12 May 1957, *W. Rauh & G. Hirsch P1252* (holotype: NY barcode 00259161 digital image!; isotypes: US barcode 00123412 digital image! [fragment], USM-248532!), **syn. nov.**

= *Senecio glareosus* Sch.Bip., Linnaea 34(5): 531. 1866, *nom. nud.* (G s.n.!, K barcode 000497781 digital image!, P barcode 01816721 digital image!, P barcode 01816722 digital image!, P barcode 01816723 digital image!).

Figure 2. *Senecio herrerae*. Peru, Cusco, near Tambomachay. Pictures by J. Ochoa (not collected).

Distribution

Peru (Cusco, Huancavelica, Junín, Lima), Bolivia (La Paz).

Taxonomic remarks

Senecio diplostephioides was described from Cusco, southern Peru. All diagnostic characters perfectly match those of *S. pflanzii*. Failing to identify any diagnostic character to discriminate more than a single species, we place *S. diplostephioides* in the synonymy of *S. pflanzii*. It is an erect or somewhat decumbent subshrub characterized by having broadly to narrowly elliptic, discolorous leaves, which are abruptly attenuate in a short pseudopetiole and progressively become oblong to oblanceolate and sessile upward. The capitula are nodding, discoid, and usually have reddish-purple corollas (Figure 3). The anther bases are auriculate.

Additional specimens examined

Peru: Cusco: Espinar, Yauri, Virginniyoc ca. 35 km de Yauri, camino de Yauri, puente viejo, Maucallacta hacia Suicutambo, 4100 m asl, 13 Apr. 1987, *P. Núñez & al. 7874* (US-01838247, as photo). Huancavelica: Tayacaja, entre Pazos y Acraquia rumbo a Pampas, 12º19'44''S 75°01'55''W, 4233 m asl, 29 May 2017, *H. Beltrán & S. Castillo 8064* (USM-305838); Llacoto-Ccolloy, a 5 km O de Conaica, 4150–4200 m asl, 18 Mar. 1951, *O. Tovar 238* (USM-248562); Machacchuay entre Conaica y Tinyacclla, 3800 m asl, 24 Mar. 1952, *O. Tovar 817* (USM-280824). Junín: Huancayo, El Tambo, Acopalca, lagunas Quinsacocha y Quellacocha (alrededores), 4478–4621 m asl, 13 May 2011, *D. Rodríguez-Paredes & R. Gonzales 383* (USM-292432). Lima: pr. Chuncal, 11°22'10''S 76°27'36''W, 4050 m asl, 25 Mar. 2005, *C. Aedo & A. Galán 10853* (USM-208010); Yauyos, Laraos, 12°20'32''S 75°43'03''W, 3900 m asl, 27 May 1995, *H. Beltrán & S. Beltrán 1764* (USM- 277351); arriba de [laguna] Chumpicocha, 4700 m asl, 28 May 1953, *E. Cerrate 2026* (USM-271688); Huarochirí, San Damián, Chanape, 11°54'53''S 76°04'35''W, 4800–5010 m asl, 9 Jul. 2013, *P. Gonzáles & B. Brito 2657* (USM-297598); Canta, Huamalle (13 km arriba de Canta), 4100 m asl, 12 Jun. 1963, *I. Meza 188* (USM-34760); Yauyos, Laraos, Lancaque, 12°21'00''S 75° 45'50''W, 4454 m asl, 10 May 2011, *E. Navarro & D. Paredes 831* (USM-308945); Canta, Lachaqui, roquedales de Parca-parca, 4100 m asl, 22 Jul. 2001, *G. Vilcapoma 5548* (USM-251438).

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Figure 3. *Senecio p lanzii*. Peru, Huancavelica, Pazos-Huaribamba. Pictures by H. Beltrán (*Beltrán 8064*).

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